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Exponentials and Logarithms - Lesson 3

Solving Exponential Inequations

LI

- Solve exponential inequations .

SC

- Logarithmic Rules.
- Using the log and ln buttons on the calculator correctly.

Example 1

Find the smallest integer value of n for which $3(10^n) > 40$.

Method 1

$$3(10^n) > 40$$

$$\Rightarrow \quad 10^n > 40 / 3$$

$$\therefore \quad n(\log_{10} 10) > \log_{10}(40 / 3)$$

$$\Rightarrow \quad n(1) > \log_{10}(40 / 3)$$

$$\Rightarrow \quad n > 1.12\ldots$$

$$\therefore \quad \boxed{n = 2}$$

Method 2

$$3(10^n) > 40$$

$$\Rightarrow \quad 10^n > 40 / 3$$

$$\therefore \quad n(\ln 10) > \ln(40 / 3)$$

$$\Rightarrow \quad n > (\ln(40 / 3)) / (\ln 10)$$

$$\Rightarrow \quad n > 1.12\ldots$$

$$\therefore \quad \boxed{n = 2}$$

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Example 2

Find the largest integer value of n for which $6^n < 20$.

$$6^n < 20$$

$$\therefore \quad n \ln 6 < \ln 20$$

$$\Rightarrow \quad n < (\ln 20) / (\ln 6)$$

$$\Rightarrow \quad 1.67\ldots > n$$

$$\therefore \quad \boxed{n = 1}$$

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Example 3

Find the largest integer value of n for which $(0.2)^n > 0.007$.

$$(0.2)^n > 0.007$$

$$\therefore \quad n \ln(0.2) > \ln(0.007)$$

$$\Rightarrow \quad n < (\ln 0.007) / (\ln 0.2)$$

$$\Rightarrow \quad n < 3.08\ldots$$

$$\therefore \quad \boxed{n = 3}$$

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Example 4

Find the smallest integer value of n for which $(0.6)^n < 0.63$.

$$(0.6)^n < 0.63$$

$$\therefore \quad n \ln(0.6) < \ln(0.63)$$

$$\Rightarrow \quad n > (\ln 0.63) / (\ln 0.6)$$

$$\Rightarrow \quad n > 0.90\ldots$$

$$\therefore \quad \boxed{n = 1}$$

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1) Find the smallest integer value of n such that :

(a) 5 $3^n > 100$

(b) 11 $2^n > 1\,200$

(c) 18 $(1.5)^n > 1\,000$

(d) 4 $(0.8)^n < 0.5$

(e) 5 $(0.4)^n < 0.02$

2) Find the largest integer value of n such that :

(a) 11 $2^n < 3\,000$

(b) 5 $5^n < 15\,000$

(c) 3 $(1.2)^n < 2$

(d) 4 $(0.6)^n > 0.08$

(e) 0 $(0.7)^n > 0.8$

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